

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES



**OFFICE OF FISHERIES
INLAND FISHERIES SECTION**

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

COCODRIE LAKE

**WATERBODY EVALUATION &
RECOMMENDATIONS**

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED EVERY THREE YEARS

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sportfish species are managed to provide a sustainable population while providing anglers with the opportunity to catch or harvest numbers of fish adequate to maintain angler interest and efforts. Anglers are also afforded the opportunity to catch quality sized largemouth bass through the introduction of Florida largemouth bass. Frequent introductions of Florida largemouth bass provide the foundation for quality and memorable bass through the incorporation of genetic material into the bass population.

Commercial

A commercial fishery does exist on Cocodrie Lake, but is very limited.

Species of special concern

No threatened or endangered species have been observed in Cocodrie Lake.

EXISTING HARVEST REGULATIONS

Recreational

Statewide regulations have been in effect for all species since impoundment.

<http://www.wlf.louisiana.gov/fishing/regulations>

Commercial

State wide regulations

<http://www.wlf.louisiana.gov/fishing/regulations>

Species of Special Concern

NA

SPECIES EVALUATION

Recreational

Largemouth bass (*Micropterus salmoides*) are targeted for evaluation since they are a species indicative of the overall fish population due to their high position in the food chain and because they are highly sought after by anglers. Electrofishing is the best indicator of largemouth bass abundance and size distribution, with the exception of large fish. Sampling with gill nets determines the status of large bass and other large fish species.

Largemouth Bass-

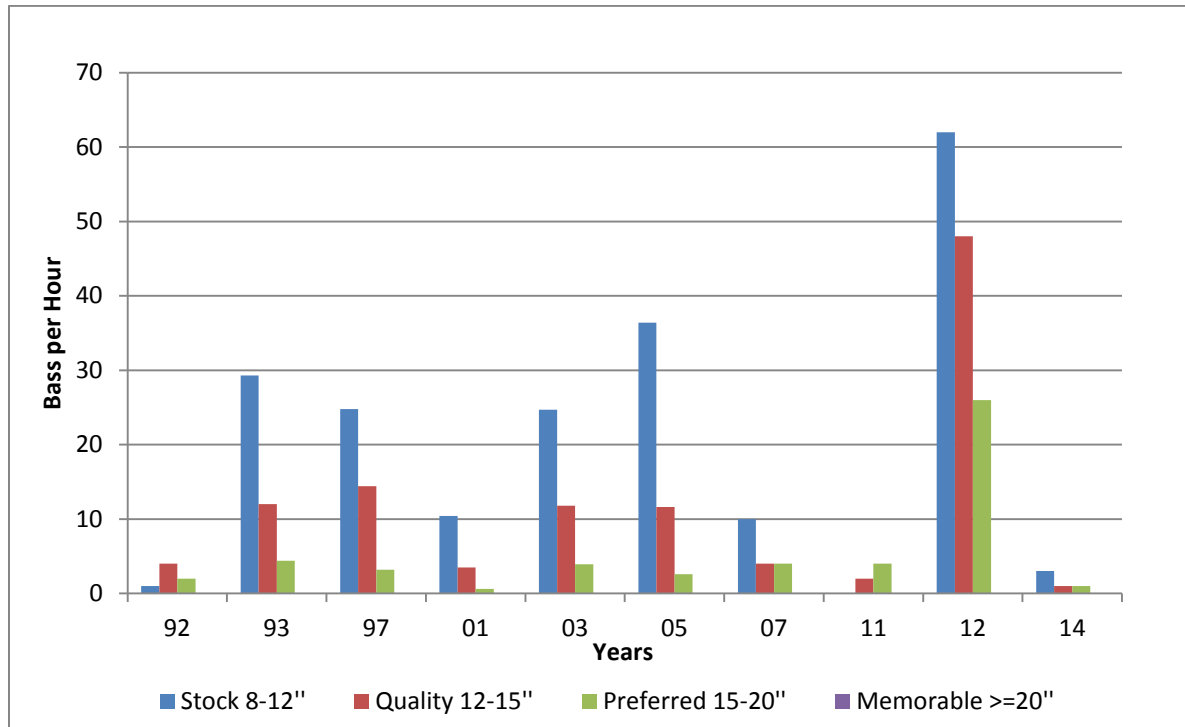


Figure 1. Spring Electrofishing Catch-Per-Unit-of-Effort (CPUE: number per hour) for largemouth bass of stock-, quality-, preferred-, and memorable-size fish captured at Cocodrie Lake, LA, for years 1992-2014.

Abundance and relative weight-

Catch-per-unit-of-effort (CPUE) of largemouth bass collected from Cocodrie Lake by electrofishing from 1992 to 2014, indicate a wide degree of variability in some years (e.g., 2005 compared to 2007), however the long-term trend is one of stability in abundance (Figure 1). Electrofishing sampling is conducted during day time hours. The number of sample sites is determined by the total acres of a water-body. Four sites are sampled on Cocodrie Lake, each representing different habitat types such as aquatic vegetation lines, shoreline, and heavy timber. As indicated in Figure 1, the abundance of all size groups of bass was lowest in 2001, 2011 and 2014 with the highest total CPUE noted in 2012. Decline in the number of bass per hour in 2001 is closely related to the drought of 1999 and 2000.

Lake levels receded 3-4 feet below pool stage and remained there for several months during the summer of 1999 through the early months of 2000. Substantial predation on young-of-the-year (YOY) sportfish in association with the low water levels is suspected. Sample catch rates began a slow upward trend after 2001, when lake levels returned to pool elevation (51.0 ft. MSL). Low CPUE for largemouth bass in the 2007 and 2011 samples may be attributed to excessive aquatic vegetation (*Salvinia* in particular), and the low CPUE in 2014 may be related to poor water quality conditions during sampling efforts.

Forage-

Sunfish and gizzard shad have been identified as primary bass forage species in Cocodrie Lake. During fall electrofishing, a 900 second sample is collected to determine forage abundance. However, there is a difference between forage abundance and availability. Measurements of largemouth bass body condition are recorded to determine utilization of available forage. Relative weight (Wr) is a measure of fishes “plumpness” and is the ratio of the fish weight to that of a determined standard weight for healthy fish. Largemouth bass Wr below 80 may indicate a potential problem with forage availability, while Wr near or above 100 indicates a healthy bass population. Lake Cocodrie is often heavily infested with submersed aquatic plants. High densities of submersed aquatic plants usually favor prey species which utilize cover to elude predators, but preclude a sight predator’s ability to effectively forage. Despite the abundance of prey cover and visual barriers, the relative weights for Cocodrie Lake largemouth bass Wr average near 99 across all size groups (Figure 2).

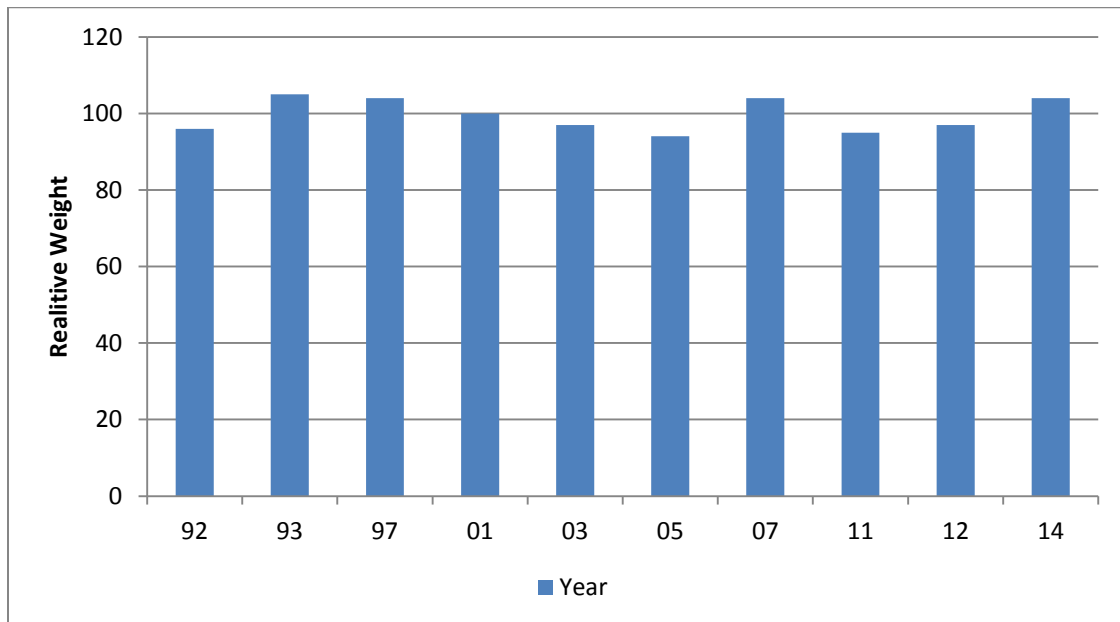


Figure 2. Average relative weights (Wr) of largemouth bass collected in fall electrofishing samples from Cocodrie Lake, LA, for the years 1992 – 2014.

The n value in 1992 was only seven bass, but in other years the n value ranged from 28 – 126, except in 2011 and 2014 when only two to five bass were collected. Relative weights for largemouth bass in Cocodrie Lake were near 100 or above in 50% of the years in which W_r was measured. Few largemouth bass have been collected by electrofishing techniques in some years due to heavy infestations of submerged aquatic plants. Other factors can lead to poor body condition such as poor water quality, abundant aquatic vegetation and fish kills related to hurricanes and tropical storms. After 2014, standardized samples for largemouth bass will be collected every third year thereafter.

Sunfish-

Sample gear types used in Cocodrie Lake consists mainly of electrofishing and gill net samples. These gear types are not used for reliable estimates of sunfish relative abundance.

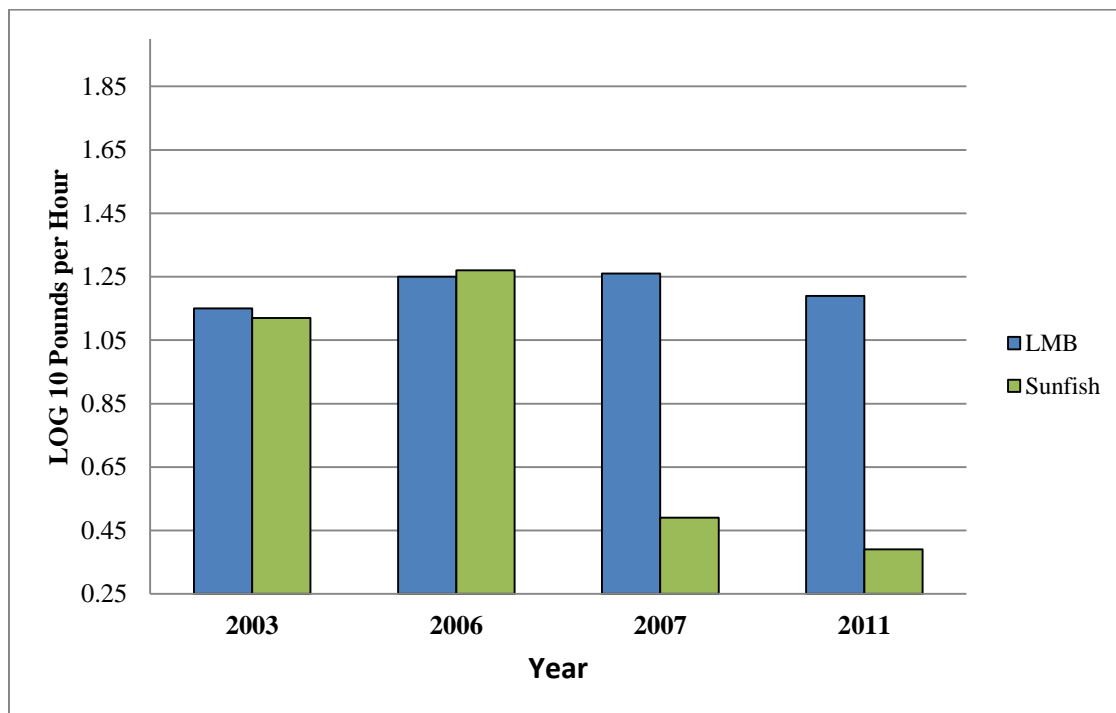


Figure 3. Log-transformed weight of fish captured per hour in fall forage samples for Cocodrie Lake, LA, 2003 – 2011.

Log-transformed weight per hour of largemouth bass and sunfish during the previous three forage sampling events is presented in Figure 3. Total pounds of sunfish collected in the fall of 2007 and 2011 fell to 3.1 and 2.4 pounds, respectively, from 18.7 pounds in 2006.

In 2003 and 2006, bass and sunfish pounds sampled per hour were nearly equal, but sunfish sampled declined in 2007 and 2011. Sample results for these years are in question due to the interference of common salvinia. By necessity, electrofishing sites were moved to alternate locations without salvinia. Samples were not conducted from 2008 – 2010 due to the three year drawdown to control the spread of common salvinia.

The total pounds captured per hour by electrofishing were calculated for fall forage samples (Table 1). All common carp, buffalo and garfish collected were greater than 6 inches in total length (TL). Also, the majority of largemouth bass captured were greater than 6 inches TL. Overall pounds decreased in 2007 due to only two bluegill inch groups being represented in samples. These numbers may have declined due to abundant vegetation that curtailed some sampling efforts. Again pounds decreased in 2014 which may relate to poor water quality conditions during sampling efforts.

Table 1. Estimate of lbs./hr. for all species of fish captured during fall forage electrofishing samples on Cocodrie Lake, La, 2003, 2006, 2007, 2011, 2012 and 2014.

Species	2003	2006	2007	2011	2012	2014
LMB	14.2	17.8	18.0	15.0	21.5	3.21
White Crappie	7.2	0.1	0	0	0	0
Bluegill	6.7	11.0	1.0	1.6	22.7	0.17
Longear Sunfish	6.3	6.9	0	0	0	0
Green Sunfish	0.2	0	0	0	0	0
Redear Sunfish	0	0	2.1	0.8	15.4	0
Common Carp	102.0	0	0	0	0	0
Smallmouth Buffalo	31.9	0	0	0	0	0
Spotted Gar	18.7	0	8.1	0	0	14.9
Shortnose Gar	11.5	0	0	0	0	0
Gizzard shad	2.4	7.0	1.7	0	86.3	0
Miss. Silversides	0.2	0.2	0	0.1	0.12	0
Yellow Bass	0	5.4	0	0	0.97	0
Orangespotted sunfish	0	0.8	0	0	0.3	0
Channel Catfish	0	3.1	0	0	8.75	0
Threadfin shad	0.2	0.4	0	0	0.26	0
Pirate Perch	0	0	0.01	0	0	0
Black Crappie	0	0	1.6	4.2	0	0
Mosquito Fish	0.02	0	0	0	0	0
Warmouth	0	0	0	0.01	0	0
Bowfin	0	0	0	7.0	0	49.4
Spotted Sucker	0	0	0	5.3	0	0

Crappie-

Relative abundance and size structure-

Electrofishing samples (Figure 4) show size groups from 3 inches to 13 inches of both black and white crappie. Numbers are relatively low but a good size distribution is shown over four years of sampling. Relative weights were consistent through all inch groups which indicate a good forage base availability in Cocodrie Lake. The samples were taken in spring

to avoid considerable duck hunting activities that take place on the lake during the fall months.

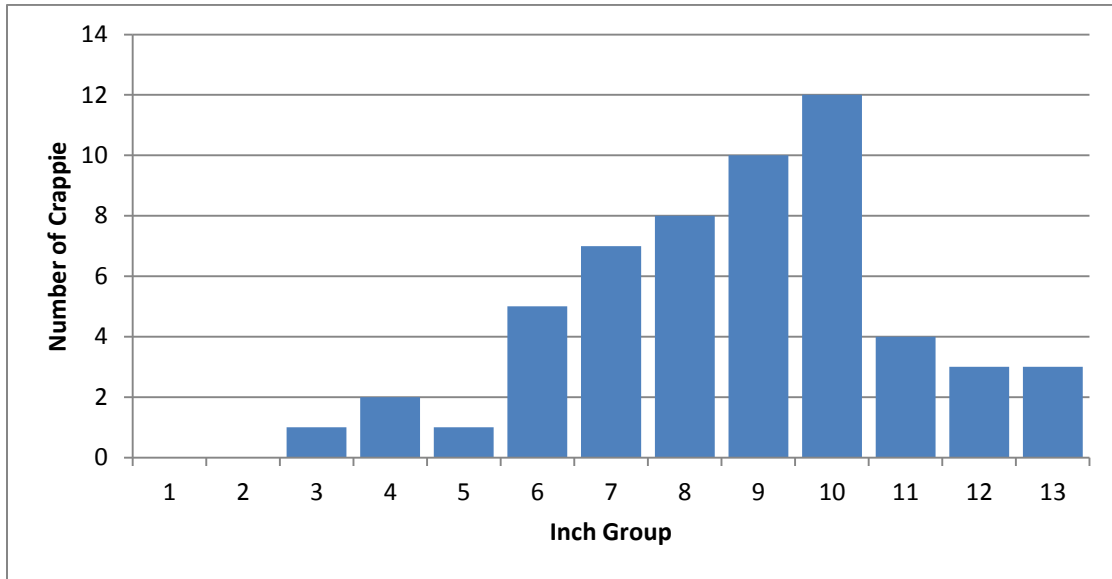


Figure 4. The size distribution of crappies (black and white crappie combined) captured in electrofishing samples on Cocodrie Lake, LA during the years 2003, 2005, 2007 and 2011.

Catch per unit effort (CPUE) of crappie collected from Cocodrie Lake by electrofishing samples between the years 1992-2014, indicates annual variability in the number captured per hour (Figure 5). In the years 1992 and 1997, there were none captured by electrofishing. This may be due to poor water quality parameters, but most likely gear or station bias was responsible. Normal stations were unable to be sampled due to heavy infestations of common salvinia throughout the lake, therefore stations were altered. In 1999-2000, drought conditions caused water levels to fall 3 feet below pool stage. Crappie numbers generally increased after the low water years (Figure 5). From 2001-2007, crappie catch rates increased substantially. From 2008–2010, samples were not conducted due to a three year drawdown to control common salvinia. In the spring of 2011, lake conditions had improved and electrofishing samples were once again resumed. Electrofishing results in 2011 and 2012 show quality-size and preferred-size crappie in the population as shown in Figure 5. In 2014, numbers decreased which may be related to poor water quality conditions during sampling efforts.

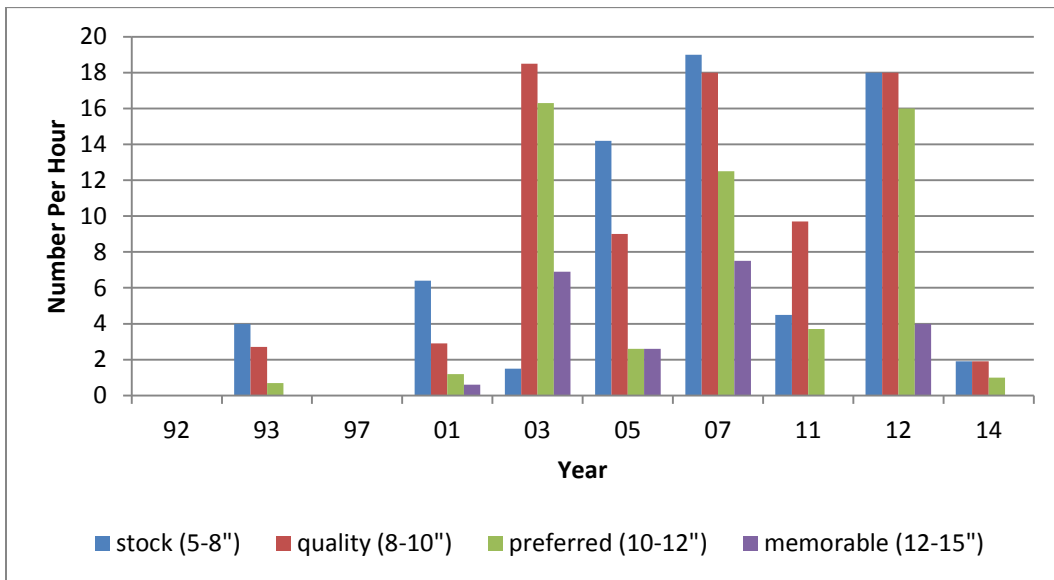


Figure 5. Electrofishing catch-per-unit-of-effort (CPUE: number per hour) for crappies (both species combined) of stock-, quality-, preferred-, and memorable-size fish captured at Cocodrie Lake, LA, for the years 1992-2014.

Leadnets-

Cocodrie Lake was sampled for the first time with lead nets for crappie in 2012. Length distributions of crappie indicate good numbers of fish up through the twelve inch size group (Figure 6). The majority of crappie captured consisted of black crappie. The three years of water level fluctuations (drawdown and drought) from 2008–2010 to control common salvinia decreased aquatic vegetation and dried out shorelines. The resulting improvements in water surface and spawning habitat may be responsible for the increase in crappie abundance and size structure.

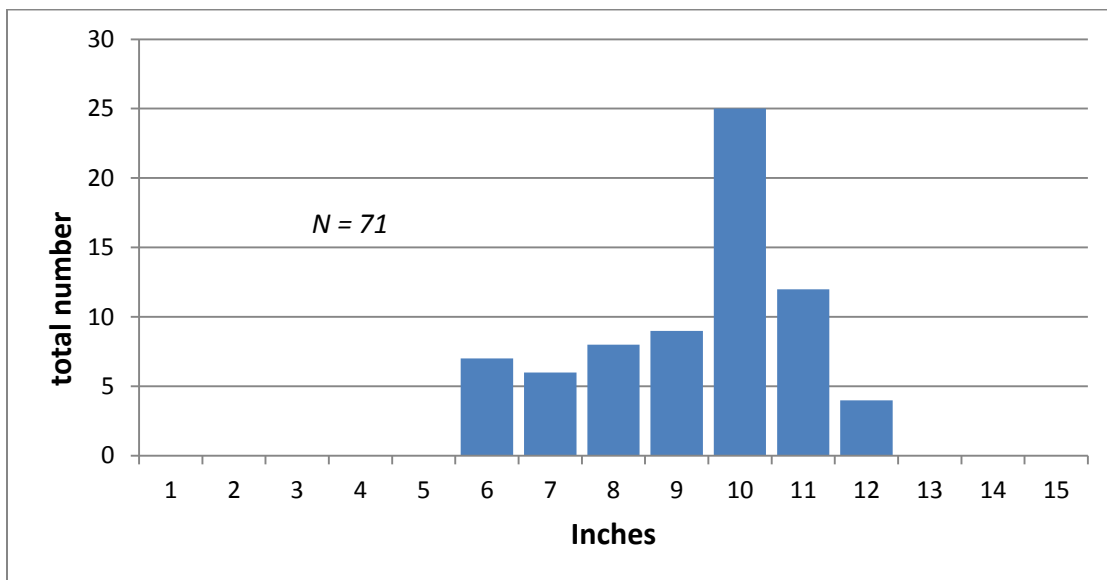


Figure 6. Size distribution of crappies (both species combined) captured in lead net samples at Cocodrie Lake, Louisiana in 2012.

Commercial

Commercial fishing is very limited in Cocodrie Lake. Occurrence of anglers targeting this fishery is low. Species targeted include buffalo, freshwater drum and common carp (Table 2).

Table 2. Total number of all fish species captured by gill net per year for Cocodrie Lake, LA for 1994, 1996, 2001, 2004, 2009 and 2014.

Species	1994	1996	2001	2004	2009	2014
LMB	10	4	3	4	3	0
Common Carp	6	0	15	2	1	4
Freshwater Drum	1	1	6	0	0	0
Bigmouth Buffalo	21	13	13	2	5	3
Smallmouth Buffalo	22	4	49	4	15	8
Black Buffalo	5	0	0	0	0	0
Spotted Sucker	2	0	1	0	0	0
Bowfin	0	25	64	11	42	29
Gizzard Shad	0	0	1	2	0	0
Yellow Bullhead	0	0	0	1	1	0
Flathead Catfish	0	0	0	1	0	0
Grass Carp	0	0	1	0	0	0
Total Fish	61	48	153	27	67	44

Monofilament gill nets are fished to determine the size distributions of large sportfish, rough fish or commercial fish species inhabiting a water body. The minimum number of gill net sets is determined by the surface area of the impoundment. A net set consists of four, 100 yard nets of the following mesh sizes: 2.5 inches, 3 inches, 3.5 inches and 4 inches. Gill nets are set within one hour of sunset and retrieved as soon as possible after sunrise. Sets are restricted to the time period between December 1 and February 28 in order to avoid temperature related mortality. All fish captured are individually measured, total length, in millimeters and weighed in grams. Buffalo fish is the most numerous species followed by bowfin, common carp and freshwater drum. Largemouth bass captured in gill nets have ranged in size from 16-20 inches total length, showing signs of quality-size and preferred-size fish are available in the lake. Overall numbers of commercial species are relatively low, attracting little attention from commercial fishermen.

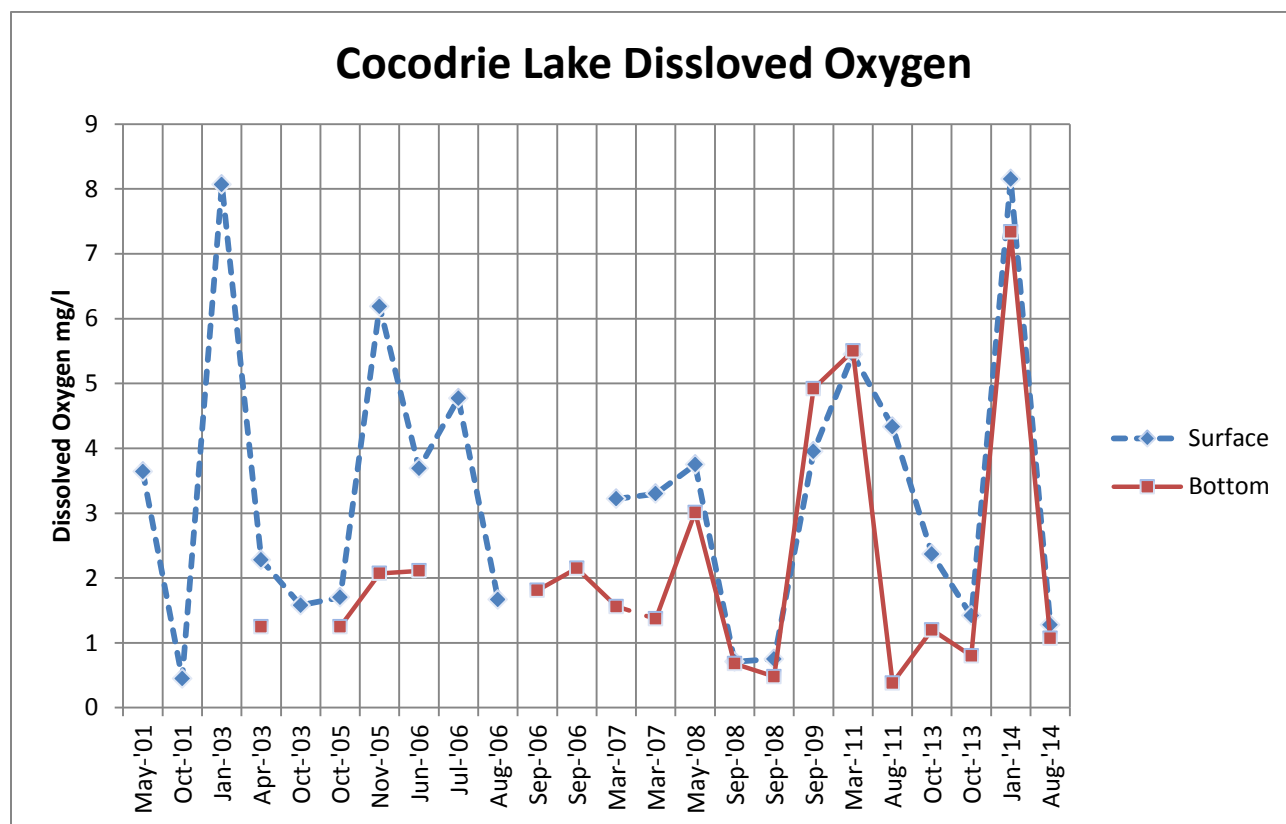


Figure 7. Dissolved oxygen readings taken during electrofishing samples and random samples in Cocodrie Lake, Louisiana, years 2001 – 2014.

Dissolved oxygen (DO) levels have been very problematic on Cocodrie Lake throughout the years (Figure 6). If DO levels fall below 2.0 mg/l it causes fish to stress and can be fatal. Cocodrie Lake DO levels are very low during mid-summer to early fall due to certain bio-physical features such as decomposition of dense aquatic vegetation and organic matter. These features limit the natural water circulation within the basin, and oxygen diffusion at the air/water interface is minimal. Fish kills have occurred sporadically over the years due to low DO events. The events were primarily related to low water levels during summer, high temperatures, large amounts of decomposing organic matter, and an accompanying tropical storm/hurricane event which mixed hypoxic bottom water throughout the lake. The poor water quality in the lake correlates somewhat to low catch rates found in our standardized samples over the years. From 2008 – 2010 the control gate was opened and remained so for three years in order to control the spread of a common salvinia infestation. The water level fluctuated from 2-6 ft. below pool stage during this time period. Dissolved oxygen levels did improve during this time as open water areas increased. Fisheries abundance is expected to increase with improvement in water quality and habitat. In 2013 and 2014, DO levels decreased as low catch rates were found in standardized samples conducted in 2014.

HABITAT EVALUATION

Aquatic Vegetation

Aquatic plant control has played a key role in the past and present management of Cocodrie Lake. Currently the most abundant aquatic vegetation species is the nuisance invasive plant, common salvinia. In 2007, salvinia covered approximately 75 % of the lake. In addition, other floating plant species, including duckweed and water hyacinth, have become more abundant throughout the lake. Drawdowns have been conducted to control the spread of the above mentioned plants. From 1995 – 1997, three to four foot drawdowns were conducted annually to expose the infested areas of the lake, but met with limited success due to having only one four foot gate to dewater a 6,000 acre lake. From 2008 – 2010 the gate remained opened year round as a measure for control of common salvinia. Spray crews continued to apply herbicide, with some success, as the plants receded from the woods. During the hard freeze of December 2009 and continued cold weather in January of 2010, the coverage of common salvinia was reduced to approximately 10% of the lake.

In 2011, there was approximately 5 % coverage of common salvinia throughout the lake. In addition, floating plants such as duckweed (5% coverage) and water hyacinth (10% coverage) were spread throughout the lake.

In 2012, common salvinia began to re-establish itself throughout the lake. This plant covered approximately 30% of the lake. Submerged plants such as coontail and fanwort make up 5% of the vegetative cover. Other plants include American lotus, water hyacinth, and duckweed which make up approximately 10 percent of plant coverage.

In 2013, common salvinia covered approximately 25% of the lake. Submerged plants such as coontail and fanwort made up 10% of the vegetative cover. Other aquatic plants present include American lotus, alligator weed, and duckweed which make up approximately 10 percent of plant coverage.

In 2014, common salvinia covered approximately 300 acres (5%) of the lake. The decrease in the amount of salvinia is likely due to the freezing weather conditions during the winter of 2013/2014. Submerged plants such as coontail and fanwort made up 10% of the vegetative cover. Other aquatic plants present included American lotus, water hyacinth, and duckweed which made up approximately 10 % of plant coverage.

In 2015, common salvinia covered approximately 500 acres (8%) of the lake. Also, giant salvinia was observed for the first time on October 22, 2015 near the spillway. It covered approximately 50 acres at the time. Submerged plants such as coontail and fanwort made up 10% of the vegetative cover. Other aquatic plants present included American lotus, water hyacinth and duckweed which made up approximately 10 percent of plant coverage.

Plant growth projections for 2016 include common salvinia covering approximately 600 acres, and giant salvinia covering 250 acres. Submerged plants such as coontail and fanwort will remain at approximately 600 acres located primarily along the shoreline and the lower end of the lake. Other aquatic plant such as water hyacinth, lotus and duckweed will make up approximately 700 acres throughout the lake.

Substrate

The Cocodrie Lake bottom accumulates a large quantity of tupelo gum (*Nyssa aquatica*) and cypress (*Taxodium distichum*) leaf litter each year. Current drawdown practices have allowed for desiccation and subsequent oxidation and compaction of accumulated organics, especially in shallow areas less than 3-5 feet in depth.

CONDITION IMBALANCE / PROBLEM

Currently aquatic vegetation greatly exceeds the recommended range of complex cover needed for adequate sportfish production. Cocodrie Lake anglers do not approve of frequent extensive drawdowns due to the related hindrance to boating access. Nuisance aquatic vegetation, particularly common salvinia, continues to inhibit recreational usage and management activities in Cocodrie Lake. Fall standardized fisheries samples are restricted due to waterfowl hunting. The current drawdown structure is grossly inadequate for a reservoir of this size and is in need of renovation. The Cocodrie Lake bottom accumulates a large quantity of organics in the form of leaf litter and aquatic plants each year. This could be neutralized by adequate, regular drawdowns.

CORRECTIVE ACTION NEEDED

1. Submerged aquatic vegetation should be maintained at a much reduced level, around 15 - 30% area coverage.
2. Floating invasive aquatic vegetation needs to be controlled with chemical and biological applications and water level fluctuation.
3. Information should be provided to the public outlining the benefits of seasonal water level fluctuations as a management tool for controlling aquatic vegetation and improving sport fish populations.
4. A water control structure with adequate discharge capability is necessary for water level fluctuations.
5. A need to establish low flow “trigger” levels and logistics for gate openings on Cocodrie Lake by DOTD to fulfill flow volumes on Cocodrie Bayou as per requirements of Act 38.
6. Public meetings are needed to inform the citizens of all fisheries management practices.

RECOMMENDATIONS

1. Conduct chemical and biological treatments on nuisance aquatic plants, such as water hyacinth and common/giant salvinia as needed, especially in those areas that impede access to the public. Herbicide applications will continue to be conducted as per the approved LDWF Aquatic Herbicide Application Procedure.
2. Conduct public meetings to inform the public of all fisheries management decisions that affect Cocodrie Lake. Information should be provided at these meetings, which outline the benefits of seasonal water fluctuations as a management tool for controlling aquatic vegetation and improving sportfish populations. Also, all recommendations will be presented to the Evangeline and Rapides Parish Police Juries, the Cocodrie Lake Commission and CLECO Electric plant in St. Landry, Louisiana for approval.
3. Work cooperatively with CLECO and LADOTD to establish low flow criteria at the USGS gauge at Clearwater, LA which would trigger gate openings on Cocodrie Lake by LADOTD pursuant to Act 38 of the 1957 Legislature (MOU now being developed).
4. Continue standardized fisheries sampling on Cocodrie Lake every third year to assess populations.